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Dissemination of opinions and ideas via complex contagion on social networks

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09/23/2016  
Final Report

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Air Force Research Laboratory  
AF Office Of Scientific Research (AFOSR)/ IOA  
Arlington, Virginia 22203  
Air Force Materiel Command

<b>REPORT DOCUMENTATION PAGE</b>					Form Approved OMB No. 0704-0188	
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<b>1. REPORT DATE (DD-MM-YYYY)</b> 23-09-2016		<b>2. REPORT TYPE</b> Final		<b>3. DATES COVERED (From - To)</b> 01 Jul 2015 to 30 Aug 2016		
<b>4. TITLE AND SUBTITLE</b> Dissemination of opinions and ideas via complex contagion on social networks				<b>5a. CONTRACT NUMBER</b>		
				<b>5b. GRANT NUMBER</b> FA2386-15-1-4020		
				<b>5c. PROGRAM ELEMENT NUMBER</b> 61102F		
<b>6. AUTHOR(S)</b> Yoshihisa Kashima				<b>5d. PROJECT NUMBER</b>		
				<b>5e. TASK NUMBER</b>		
				<b>5f. WORK UNIT NUMBER</b>		
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> UNIVERSITY OF MELBOURNE GRATTAN ST PARKVILLE, 3052 AU				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>		
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> AOARD UNIT 45002 APO AP 96338-5002				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b> AFRL/AFOSR IOA		
				<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b> AFRL-AFOSR-JP-TR-2016-0076		
<b>12. DISTRIBUTION/AVAILABILITY STATEMENT</b> A DISTRIBUTION UNLIMITED: PB Public Release						
<b>13. SUPPLEMENTARY NOTES</b>						
<b>14. ABSTRACT</b> By incorporating a model of cultural dynamics involving both mutable (cultural) and immutable features into a model of neighborhood segregation and social network formation, this research shows that under some conditions, diversity and social network clustering (modeling sense of community) need no longer be negatively correlated, as has been claimed. This implies that diversity on immutable human characteristics (such as race or ethnicity) does not have to undermine sense of community, so long as there is a sufficient variety of possible mutable (i.e. cultural) features which people can adopt and share. A model of the coevolution of culture and cooperation was developed based on the Axelrod model of cultural dissemination and a spatial public goods game (an extension of the well-known prisoners dilemma to more than two players). The results from this model suggest that cultural diversity can actually be beneficial for the survival of cooperation, but that cultural information needs to be transmitted accurately to maintain both coherent cultural groups and cooperation.						
<b>15. SUBJECT TERMS</b> social networks, islamic extremists, online ideology						
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>  SAR	<b>18. NUMBER OF PAGES</b>  4	<b>19a. NAME OF RESPONSIBLE PERSON</b> AHLERS, KRISTOPHER	
<b>a. REPORT</b>  Unclassified	<b>b. ABSTRACT</b>  Unclassified	<b>c. THIS PAGE</b>  Unclassified			<b>19b. TELEPHONE NUMBER (Include area code)</b> 315-227-7009	

**Final Report for AOARD Grant FA2386-15-1-4020 “Dissemination of Opinions and Ideas via Complex Contagion on Social Networks”**

**09/16/2016**

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**Period of Performance:** 07/01/2015 – 06/30/2016

**Abstract:**

By incorporating a model of cultural dynamics, involving both mutable (cultural) and immutable features, into a model of neighborhood segregation and social network formation, we show that under some conditions, diversity and social network clustering (modeling “sense of community”) need no longer be negatively correlated, as has been claimed. This implies that diversity on immutable human characteristics (such as race or ethnicity) does not have to undermine sense of community, so long as there is a sufficient variety of possible mutable (i.e. cultural) features which people can adopt and share.

We also developed a model of the coevolution of culture and cooperation, based on the Axelrod model of cultural dissemination and a spatial public goods game (an extension of the well-known prisoner’s dilemma to more than two players). The results from this model suggest that cultural diversity can actually be beneficial for the survival of cooperation, but that cultural information needs to be transmitted accurately to maintain both coherent cultural groups and cooperation.

Our findings are likely to impact the scientific community by increasing the focus on cultural factors in scientific investigation of, or intervention in, diverse community settings, and to add a consideration of culture to studies of the evolution of cooperation, a very large and active research area, in which to date considerations of cultural dynamics have not played a large part.

*The two papers cited below which resulted from this project are attached as an appendix.*

**List of Publications and Significant Collaborations that resulted from your AOARD supported project:**

a) papers published in peer-reviewed journals

Stivala, A., Robins, G., Kashima, Y., & Kirley, M. (2016). Diversity and Community Can Coexist. *American Journal of Community Psychology* **57**(1-2):243-254. doi: 10.1002/ajcp.12021

Stivala, A., Robins, G., & Kirley, M. (2016). Culture and Cooperation in a Spatial Public Goods Game. *Physical Review E* **94**:032303 doi: 10.1103/PhysRevE.94.032303